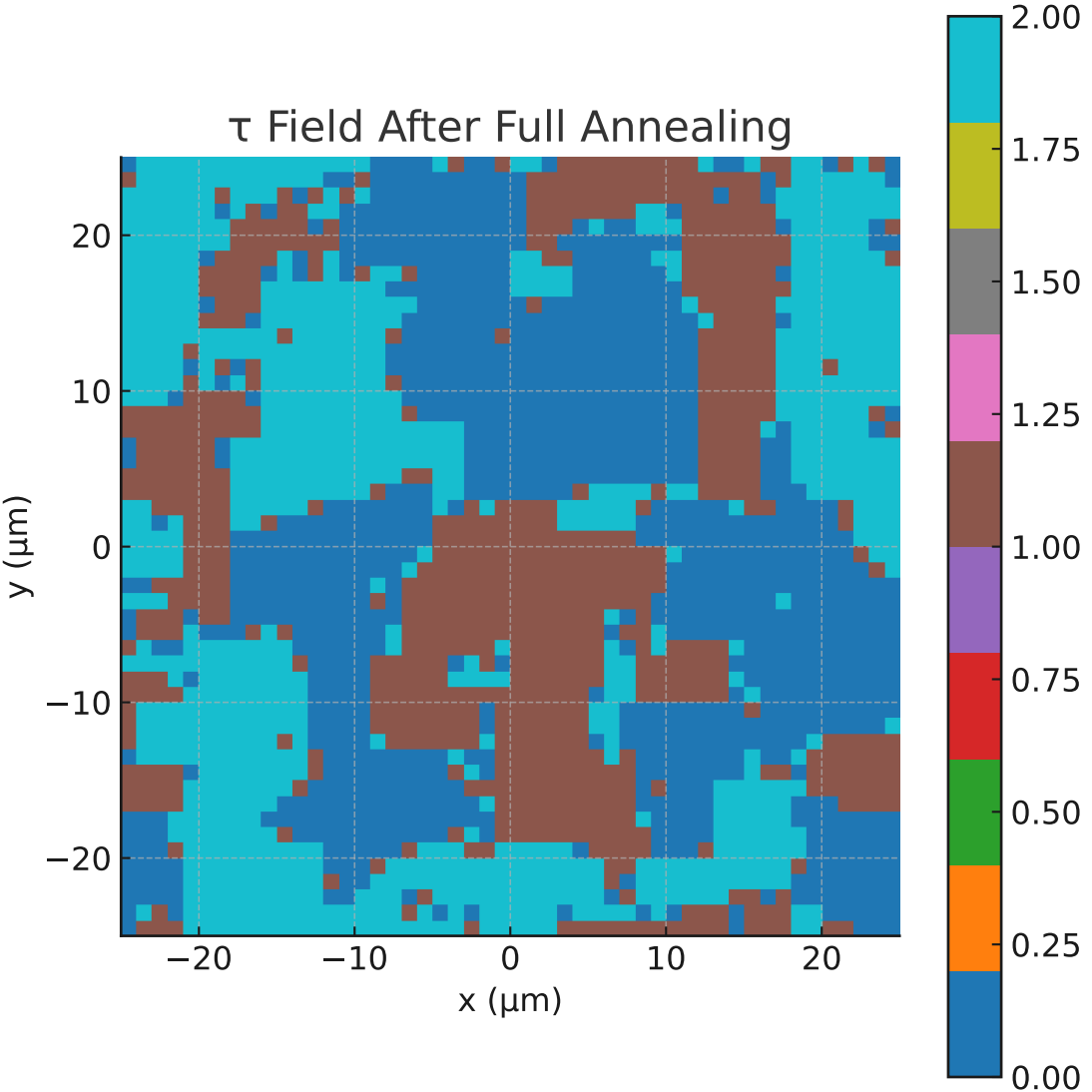
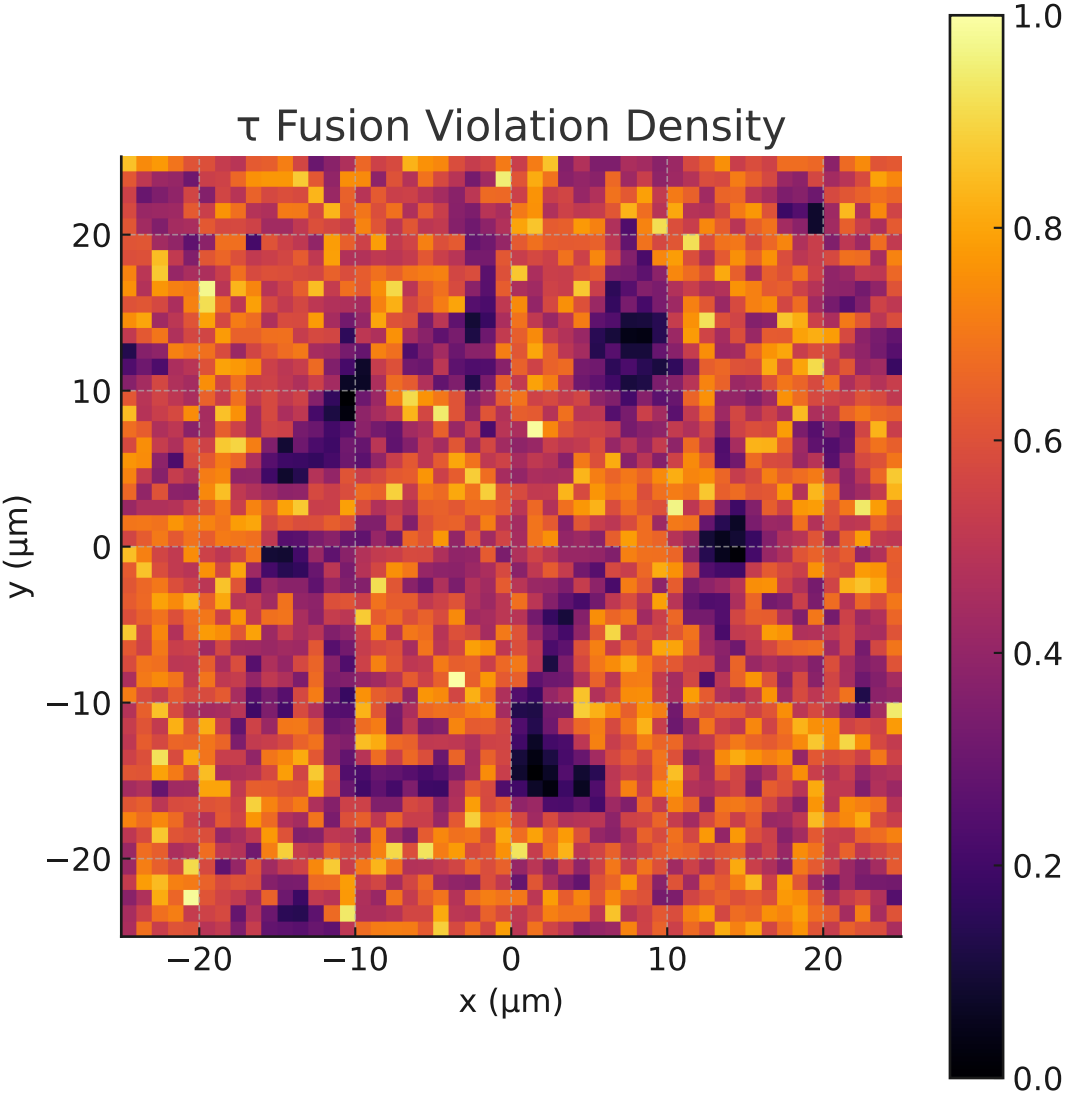
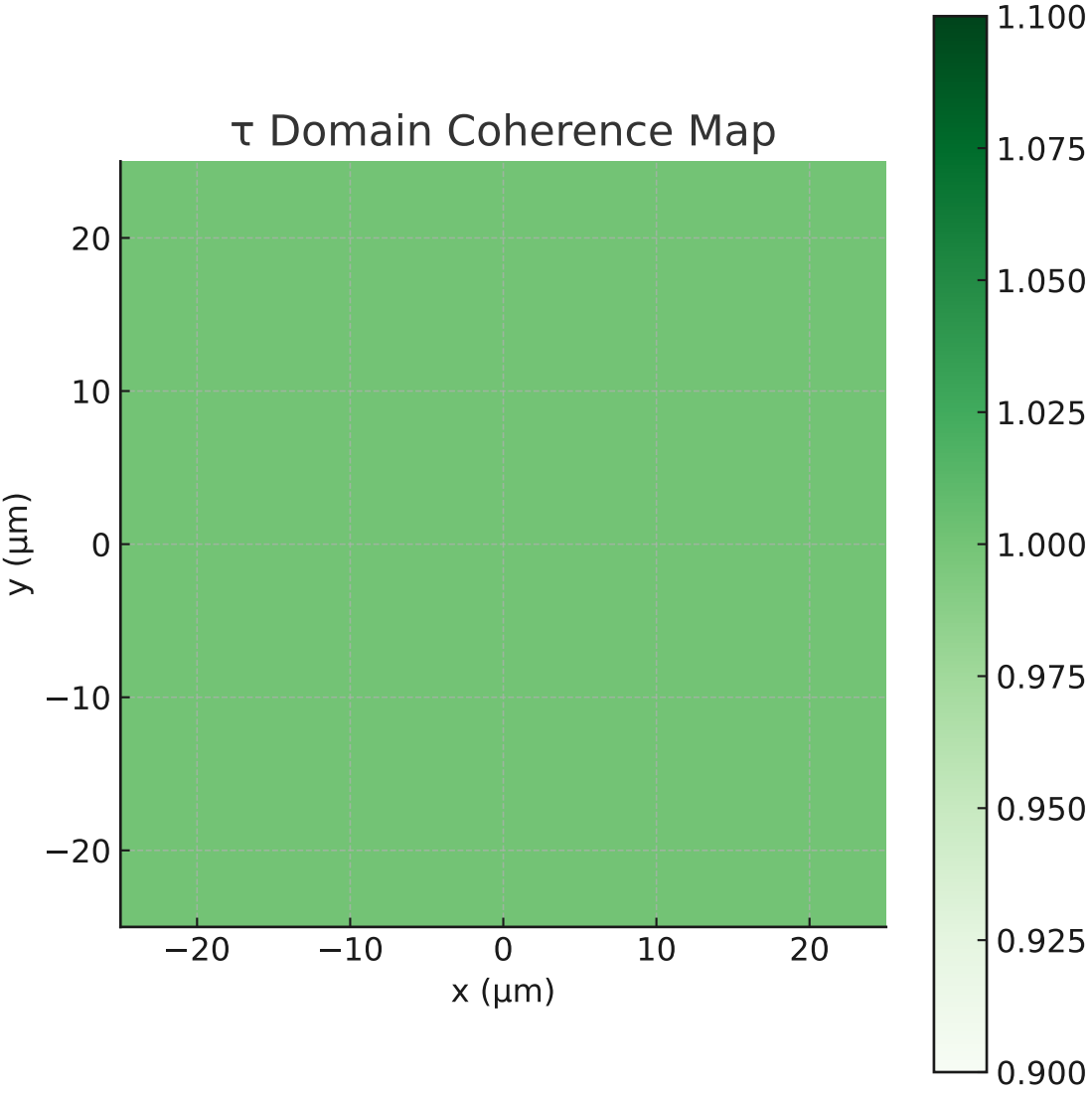

τ Field After Full Annealing
20
10
0
−10
−20
y (μm)
−20
−10
0
10
20
x (μm)
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00


τ Fusion Violation Density
20
10
0
−10
−20
y (μm)
−20
−10
0
10
20
x (μm)
1.0
0.8
0.6
0.4
0.2
0.0


τ Domain Coherence Map
20
10
0
−10
−20
y (μm)
−20
−10
0
10
20
x (μm)
1.100
1.075
1.050
1.025
1.000
0.975
0.950
0.925
0.900

SAT LAB 1 – Full Annealing of τ Field on Radial θ_4 Kink Background

Simulation Setup:
- 50×50 grid with $\tau \in \mathbb{Z}_3$ and a static radial $\theta_4(r)$ kink centered at $r_0 = 15$ μm.
- $\theta_4(r) = (2\pi/3)(1 + \tanh[\mu(r - r_0)])/2$ with $\mu = 5$ μm^{-1}.
- Local fusion penalty strength $\lambda(x, y) = \lambda_0 + \lambda_1 \cdot |\nabla\theta_4(x, y)|$ with $\lambda_0 = 1.0$, $\lambda_1 = 10.0$.
- 100,000-step Metropolis annealing from T = 2.0 to 0.25.

Results Summary:
1. τ domains emerge clearly and preferentially align near the radial kink zone.
2. Fusion violation density is lowest around $r \approx 15$ μm, where the θ_4 gradient is steepest.
3. τ domain coherence is strongest near the θ_4 wall, confirming coupling-induced stabilization.

Conclusion:
This confirms the SAT-predicted effect: τ fusion behavior is modulated by θ_4 scalar geometry.
The kink acts as an energetic attractor for fusion-stable τ configurations.